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Inseason Subsistence Salmon Catch Monitoring, Lower Kuskokwim River, 2011

Annual Report for Study 10-354
USFWS Office of Subsistence Management
Fisheries Resource Monitoring Program

by

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Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

The *Kuskokwim Inseason Subsistence Catch Monitoring* project has been a collaborative effort between Orutsararmiut Native Council (ONC) and the Alaska Department of Fish and Game (ADF&G) in the Kuskokwim River since 2001. The objective of the study has been to provide local input on salmon management decision-making during the fishing season. ONC conducted weekly in-person interviews of Bethel area subsistence fishermen at their fish camps during the peak period of salmon fishing activity from June 1 to July 10, 2011. The survey collected the following data from each family on a weekly basis: fishing methods; mesh sizes used; assessments of relative run timing; catch rates for Chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*) and sockeye (*O. nerka*) salmon; salmon harvest goals; whether salmon subsistence needs were being met. The survey also collected comments on fish health, weather conditions, and/or other factors that play a role in the harvest and processing of fish. Data collected from these surveys were used to qualitatively assess salmon run timing, relative abundance, gear usage, fishing activity, and fishermen's success in achieving their subsistence harvest goals. Surveys were summarized weekly and relayed to area fishery managers, and a verbal report was presented at inseason meetings of the *Kuskokwim River Salmon Management Working Group*. Fishery managers and research staff used the inseason survey information, in conjunction with other fisheries monitoring projects, to provide an early indication of salmon run strength, run timing, and subsistence harvest trends. The inseason survey also built management capacity by providing a venue for local users to have input into the evaluation of salmon abundance and corresponding management actions. In 2011 ONC fisheries technicians interviewed an average of 55 subsistence fishing families each week at fish camps in the Bethel area, and a total of 327 surveys was conducted for the season.

Key words: Bethel, Chinook, *Oncorhynchus tshawytscha*, sockeye, *O. nerka*, chum, *O. keta*, coho, *O. kisutch*, salmon, Kuskokwim River, Orutsararmiut Native Council, subsistence, Kuskokwim River Salmon Management Working Group.

INTRODUCTION

This report describes the findings of a collaborative study conducted by Orutsararmiut Native Council (ONC) and the Alaska Department of Fish and Game (ADF&G). Researchers collected information from fishermen about their subsistence salmon catches during a 6 week period in June and July of 2011 and presented the information at meetings of the *Kuskokwim River Salmon Management Working Group* (hereafter referred to as Working Group). Members of the Working Group and fishery managers work together to make inseason management decisions for the salmon fisheries in the Kuskokwim River drainage (Figure 1; Bailey and Carroll 2012). Study activities were coordinated through the *Kuskokwim Inseason Subsistence Catch Monitoring Program* at ONC. Participants were families using fish camps in the Bethel area between the mouth of the Gweek River and the village of Napaskiak (Figure 2).

Historically and to the present, people residing in the Kuskokwim River drainage have relied on salmon as the mainstay of their diet. Studies indicate that fish account for up to 85% of the wild resources harvested for subsistence, in pounds usable weight, in Kuskokwim River drainage communities, with salmon specifically accounting for up to 53% of total wild resources consumed (Coffing 1991). The annual harvest of salmon for home use, or subsistence, is as much as 650 pounds per capita in some of these communities (Coffing 1991; Fall et al. 2009).

There are 3 types of salmon fisheries in the Kuskokwim River drainage: subsistence, commercial, and a much smaller sport fishery. Although some non-resident sport fishermen do visit the Kuskokwim each year, participants in all 3 fisheries are mainly people who reside in the drainage. The focus of this research is the subsistence fishery. The 10-year average (2000–2009) subsistence fishery harvest of Chinook *Oncorhynchus tshawytscha*, comprised 95% of the 10-year average total utilization (i.e. harvest in all fisheries) of Chinook, 66% of chum *O. keta*, and 78% of sockeye salmon *O. nerka* (Brazil et al. 2011). The subsistence fishery harvested more

Chinook, chum, and sockeye salmon than the other 2 fisheries in the Kuskokwim River drainage combined. An estimated 197,923 salmon were harvested in the Kuskokwim Area for subsistence purposes in 2009 (the last year in which there were no major subsistence fishing restrictions imposed within the Kuskokwim River), of which an estimated 151,822 (77%) were taken by the residents of the lower river area (Carroll and Hamazaki 2012a). In 2010 an estimated 182,971 salmon were harvested for subsistence purposes in the Kuskokwim Area, of which an estimated 152,010 fish (83% of total) were taken by the residents of the lower river area (Carroll and Hamazaki 2012b).

This study was first initiated in 2001 in response to local public and fishery management staff concerns. Salmon returns to the Kuskokwim River were generally below average from 1997 to 2001 and in 2000 both Chinook and chum salmon were designated stocks of concern by the Alaska Board of Fisheries (Whitmore et al. 2008). In 2002, Chinook and chum salmon returns to the Kuskokwim River began to rebound and reached near record abundances from 2004 through 2007 (Estensen et al. 2009). This led to the Alaska Board of Fish discontinuing stock of concern status for both species. The *Kuskokwim Inseason Subsistence Harvest Monitoring Program* has continued as an important subsistence salmon monitoring assessment tool. Recently, the survey work has again become critical for harvest monitoring, outreach, and communications with fishermen, due to low Chinook salmon returns and subsequent conservation concerns in 2010 and 2011.

Since 2004 the project has been limited to the Bethel area subsistence fishery. Since 2005 the study period has been from late May through mid-July, focusing on the peak Chinook salmon migration. This reflects the priority of assessing the run abundance and timing of Chinook salmon over other species of salmon. The project is managed and conducted by staff from ONC, which is the Bethel Indian Reorganization Act (IRA) tribal council, in collaboration with the Bethel office of ADF&G, Division of Commercial Fisheries.

In addition to the inseason harvest surveys, the ONC fisheries technicians also worked with area fishermen on subsistence Chinook salmon age, sex and length sampling (ASL) and received 2 weeks of training at other salmon-monitoring projects within the Kuskokwim area. In 2011, one technician worked at the Goodnews River weir with ADF&G biologists for exposure to fisheries field research and to learn about salmon escapement monitoring. The other technician worked with ONC and ADF&G biologists at the Kalskag fish wheel project to develop a photographic fish identification guide for use in education of future fishery technicians and high school interns.

In 2011, the Kuskokwim River salmon fisheries were managed according to the *Kuskokwim River Salmon Management Rebuilding Plan* (5 AAC 07.365) adopted by the Alaska Board of Fisheries in 2001 (hereafter referred to as Rebuilding Plan). This plan provided guidelines to manage for sustained yield of salmon stocks, meet escapement goals, provide fishermen with an opportunity to harvest amounts reasonably necessary for subsistence, and in times of surplus, to provide for commercial and sport fisheries (Whitmore et al. 2008).

Much of the management direction in the Rebuilding Plan relies on inseason indicators of run strength. These inseason indicators consist of the evaluation of the following:

1. Subsistence fishery information;
2. Sport fishery harvest information;

3. Bethel test fishery catch rates;
4. Commercial harvest catch rates;
5. Escapement measures including weir and sonar passage estimates and aerial survey estimates on spawning grounds.

Both the Alaska legislature and the U.S. Congress have passed laws to protect customary and traditional uses of fish and wildlife in Alaska. Therefore, inseason fisheries management in the Kuskokwim management area must ensure that "reasonable opportunity" to meet subsistence needs be provided during the season prior to providing opportunity for commercial and sport fishing interests.

Kuskokwim River commercial fisheries concentrate effort, in order of importance, on coho, chum, and sockeye salmon with some incidental catch of Chinook early in the season. Directed Chinook salmon commercial fishing in the Kuskokwim River with 8 inch mesh was discontinued in 1987, and the mesh size was limited to 6 inch by regulation. However, due to Chinook conservation concerns and resulting subsistence restriction on Chinook harvest in 2011, buyers agreed not to buy Chinook salmon. Those caught incidentally by commercial fishermen were retained for the fisherman's personal use. A total of 19 commercial fishery openings occurred on the Kuskokwim River in 2011 from July 5 through August 22. Subsistence fishing is closed by emergency order 3 hours prior, during, and 6 hours after each commercial salmon fishing opening. Fishermen have expressed the concern that, in years in which subsistence catches are low, commercial fishing could impact their ability to meet their family's subsistence needs through interception of fish or through reduced opportunities as a result of closures.

BACKGROUND: SUBSISTENCE CLOSURES IN 2011

The 2011 preseason outlook for Chinook salmon was similar to 2010 when the Kuskokwim River drainage experienced the lowest estimated total run and spawning escapement on record. Compounding matters, escapement goals on several tributary streams had not been achieved for several years. The conservation concern surrounding Chinook salmon prompted both preseason and inseason subsistence restrictions that affected fishermen and ultimately affected survey results.

Preseason management actions were discussed and approved by the Working Group and state and federal managers (Bailey and Carroll 2012; Brazil et al. 2013). These included closures to subsistence fishing for Chinook salmon in the tributaries of the Kwethluk and Tuluksak rivers and Kuskokuak Slough with any gear, including hook and line. Nets were restricted to 4 inch mesh, traditionally used for whitefish (*Coregonus* spp.) and could not exceed 60 feet in length.

Inseason management actions included 2 periods of subsistence fishing closures by emergency order (June 16–19 and June 23–28; Brazil et al. 2013) totaling 7 days of closure; followed by 9 days (June 29 to July 7) of gear restrictions within commercial fishing District 1. Closures resulted from indications of low Chinook salmon abundance in the Bethel test fishery. Gear restrictions were designed and timed to minimize catch of Chinook salmon while allowing harvesters to make use of more abundance chum and sockeye salmon. These actions were supported by the *Kuskokwim River Salmon Management Working Group* (Bailey and Carroll 2012).

Federal management special actions (3-KS-01-11 and 3-KS-02-11) preempted state management emergency orders from June 30 until July 2, 2011 (Brazil et al. 2013). All waters within the local

federal conservation unit (the mouth of the Kuskokwim River upstream to the confluence with the Aniak River) were closed to salmon fishing and restricted to the use of 4 inch mesh nets for harvesting smaller species. This constituted a third period (3 days) of fishing closure affecting subsistence fishing activity.

In 2011, 8 commercial fishing periods were scheduled beginning On July 5 and ending July 20 (Table 1). Commercial openings were timed to harvest the later portion of the Kuskokwim River coho salmon run and to minimize incidental harvest of Chinook salmon. A total of 748 Chinook salmon were harvested in commercial openings in 2011, all of which were retained by fishermen for personal use. Subsistence closures On July 5, 7 and 9 occurred within the final week of this survey (Table 1; Brazil et al. 2013).

STUDY AREA

The Kuskokwim River drainage covers an extensive area in western Alaska originating in the Alaska Range in central Alaska, emptying into the Bering Sea. Hundreds of smaller tributary rivers and streams drain into the main stem of the Kuskokwim River making up the entire drainage. There are 5 species of salmon migrate to the Kuskokwim River drainage in spring, summer, and fall to spawn: Chinook or "king" salmon, chum or "dog" salmon, sockeye or "red" salmon, coho or "silver" salmon *O. kisutch*, and pink or "humpy" salmon *O. gorbuscha.* There are about 38 communities located in the drainage ranging in size from small villages of less than 200 people, such as Oscarville, to large subregional hub communities, such as Aniak with 572 people. The largest community in the drainage, Bethel, had a population 5,471 in 2010 according the U.S. Census.[1] The study area was located on the lower river where the majority of the harvest of salmon for subsistence in the Kuskokwim River drainage occurs. The lower river area is the area in which the most people reside and includes the regional hub community of Bethel.

OBJECTIVES

The overall goals of this project were to contribute information for the management of Chinook, chum, and sockeye fisheries in the Kuskokwim River drainage and to increase ONC's capacity to participate in fisheries research and management. The objectives for this project were to:

1. Characterize relative abundance and salmon run timing in June and July through weekly interviews with Bethel area subsistence salmon fishermen;
2. Characterize fishing activity and gear use through weekly interviews with Bethel area subsistence salmon fishermen in June and July;
3. Build management capacity by providing local input into the management process for the subsistence salmon fishery in June and July through the presentation of weekly summaries of interviews with Bethel Area subsistence salmon fishermen at *Kuskokwim River Salmon Management Working Group* meetings;
4. Gather additional information from harvest survey participants to provide qualitative assessments of harvest quality, fishing methods in relation to catch, and other factors influencing fishing success in 2011.

[1] Census 2010 Gateway. [Internet]. 2010. Washington D.C.: United States Census Bureau. Available from: http://www.census.gov/2010census/ (Accessed: January 2013).

METHODS

The primary method of data collection was a weekly census survey in each occupied fish camp in an area from the village of Napaskiak to the mouth of the Gweek River, approximately 24 river miles (Figure 2). This study area represented the primary fishing area for Bethel residents and included the overlapping fishing areas for the nearby villages of Oscarville and Napaskiak.

A survey instrument, or questionnaire, was used to collect information during survey interviews (Appendix A1). The survey instrument was developed collaboratively with staff from ADF&G, U.S. Fish and Wildlife Service (USFWS), and ONC, and has undergone only minor changes since 2001. All information was compiled by ONC and presented in a summarized format to State and Federal fishery managers and Working Group participants, and via local radio news stations, to the general public. Interview questions included family name, community of residence, date the family began fishing this year, fish camp location, and fishing area. Participation in the survey was voluntary, and the results were kept confidential. Results were reported for the entire project area, and individuals were not identified in the findings.

Fishermen were specifically asked, "Compared with this time in a normal year, how were your catch rates for salmon this week?" Answers were categorized as "Very Good," "Normal," or "Poor," and the summarized answers were viewed as an index of relative salmon abundance. In order to provide a general characterization of salmon run timing, fishermen were asked the question: "Does the salmon run appear to be running early, late, or normal?" These responses were presented in a weekly written report that summarized total responses for each question for each salmon species targeted. Fishermen were also asked whether they were fishing with setnet, drift gillnet, or hook and line. In the case of gillnets, fishermen were asked whether they were using mesh sizes greater or less than 6 inch and these answers were recorded accordingly by week. Additional interviewee comments on the health, condition and behavior of the fish, or weather patterns and other factors influencing fishing effort and success were also included in each weekly report.

Nearly all participants were interviewed at seasonal fish camps in the areas of Gweek River, Church Slough, Steamboat Slough, Straight Slough, Old Bethel Airport, Oscarville Slough, Napaskiak Slough, the mainstem Kuskokwim River, and adjacent to Bethel (Figure 2). When the program began, subsistence fishing families were contacted at their camps, informed about the goals and objectives of the program, and asked if they were interested in participating. Subsequently, for each week of the survey period, technicians attempted to contact each family on the participant list. The contact list changed over time, when new families were contacted and decided to participate in the program or people on the list moved away, discontinued fishing at their fish camp, or declined to participate. Many families have been participating in the survey each year for the duration of the program. However, in the past 2 survey years some of the families that have been involved since the inception of the program appear to have discontinued fishing in the area as their fish camps were vacant during the 2011 survey. A few subsistence fishermen that were not contacted in the past agreed to interviews in 2011 and were added to the weekly survey route. People that wished to participate in the program were included if their salmon processing sites were within the study area, and they self-identified as long-term subsistence fishermen. Additional contacts were made by phone in 2011 to families who were known to have fish camps located in Bethel.

Subsistence fishermen were sometimes interviewed at the Bethel boat ramp when they returned from fishing. Some Bethel fishermen who had long been a part of the survey program were contacted by phone at their homes if they were not encountered at their fish camp or the boat ramp. The number of interviews reported each week was variable, and included everyone who was interviewed whether at their fish camp, at the boat harbor, or in town. Most fishermen who were interviewed represented a larger extended family group participating in salmon harvesting, processing, and preserving. Others who processed the fish contributed information on fish health, drying conditions, or other important environmental details.

In 2011, field season preparations began on May 25 and subsistence catch monitoring interviews began on June 2. Two technicians conducted interviews Thursday through Sunday of every week from June 2 through July 10. Weekly written reports summarizing the responses of the subsistence fishermen were completed by ONC and sent to ADF&G staff the Monday following the interview week. In 2011 due to emergency subsistence fishing closures for Chinook conservation, additional survey days were added to reach people at their fish camps during the open fishing periods. Midweek reports were summarized in some cases to provide prompt feedback to the *Kuskokwim River Salmon Management Working Group* and fisheries management staff.

RESULTS

On average, 55 families were interviewed weekly regarding their subsistence fishing activities, with a total of 327 interviews conducted in 2011 (Table 2). In all, 6 weekly interview summaries were compiled for Working Group packets and presented verbally by ONC staff at Working Group meetings during June and July 2011 (Appendices B1–B6).

WEEKLY CHARACTERIZATIONS OF SALMON CATCH RATES

Weekly summaries of the catch rates are presented as the way in which respondents categorized their fishing success (Table 2). The chum and sockeye salmon runs typically begin to pass Bethel after the Chinook salmon run is well underway and fishermen tend to decline to comment on these later species until they have information to assess the run. However, it is rare for fishermen to target these species within the first week of the survey, so lack of comment does not necessarily indicate that chum and sockeye salmon are not present in late May/early June.

Chinook Salmon

For the first survey week ending June 5 exactly half reported catch rates were "Very Good" and the other half reported catch rates as "Normal" (Table 2). In the second survey week ending June 12 very few respondents indicated that their catches were "Very Good," and the remainder was roughly divided between those indicating their catch rates were "Normal" (34%) and "Poor" (49%). By the third week of the survey period ending June 19, responses varied with a similar numbers of fishermen indicating catch rates in each category. In week 4, the majority of respondents indicated that their catches were "Poor" (64%). However, by the fifth week of surveys ending July 3, the majority of fishermen responded that their catch rates were "Very Good" (66%) for that time period. In the final survey week, ending July 10, there was a reversal with the majority of fishing respondents indicating that catch rates were "Poor" (67%; Table 2).

Chum Salmon

For the first survey week ending June 5, all fishing respondents declined to comment on their chum salmon catch rates as they felt it was too early in the run to assess (Table 2). In the second and third survey weeks, ending June 12 and June 19, the majority reported the catch rates were "Normal". In the fourth survey week ending June 26 there was a mixture of responses, with similar numbers reporting "Normal" or "Poor" catch rates (36% and 35%). In the fifth and sixth survey weeks, ending July 3 and July 10, the majority of fishing respondents (78% and 80%) characterized their catch rates as "Very Good" (Table 2).

Sockeye Salmon

For the first survey week ending June 5, half the fishing respondents reported "Very Good" catches of sockeye salmon and half reported their catch rates as "Normal" for that time period. In the second through fourth survey weeks, the majority of respondents characterized their sockeye salmon catch rates as "Normal". For the fifth survey week ending July 3, most respondents indicated that their sockeye salmon catches were "Very Good". By the last survey period ending July 10, the respondents who were still fishing reported a mix of catch success for sockeye salmon with approximately a third each reporting either "Very Good", "Normal", or "Poor" catch rates (Table 2).

WEEKLY CHARACTERIZATION OF SALMON RUN TIMING

In responding to the question "Compared with this time in a normal year how was run timing for this week?" some people declined to comment on run timing. Usually this was because they felt they could not assess the run if it had not arrived or had already passed, or they were no longer targeting the species in question.

Chinook Salmon

Throughout the survey, the majority of respondents reported that the Chinook salmon run timing was "Normal." In the first and final weeks of the survey, there was more disagreement; however, samples sizes were smaller at those times because fewer families were fishing (Table 3).

Chum Salmon

Overall, respondents indicated that the chum salmon run timing was "Normal." There were no comments on chum salmon run timing in the first week, and in the second, the majority of respondents indicated that the run was "Early." However in the 4 remaining weeks, it was clear that most respondents felt the run was "Normal" (Table 3).

Sockeye Salmon

Similar to chum salmon, most respondents indicated that the sockeye salmon run timing was "Normal." In the first and second weeks of the survey, most respondents felt that the run was "Early." However, in the second week, the proportion indicating that the run was "Normal" was similar to that reporting "Early" run timing. In the remaining 4 weeks of the survey, the great majority of respondents indicated "Normal" run timing (Table 3).

WEEKLY FISHING ACTIVITY AND GEAR USE

Gear categories included the most common methods of capturing salmon for subsistence use in the Bethel area including drift net, set net, use of *both* drift and set net (during the survey week),

and rod and reel (Table 4). In the first survey week, of 36 families contacted, only 11 were fishing. For this survey week ending June 5, 64% of the families reported using setnets, 27% reported using drift gillnets, and 9% reported using both types of nets in the same week. Eighty-two percent of fishermen reported using gill nets with 8 inch mesh referred to as "King" gear. During this survey week 9% of fishermen reported using 6 inch or smaller mesh, and 9% reported using both mesh size categories (Table 4).

For the survey week ending June 12, of the 69 families surveyed, 41 were actively fishing and the rest indicated they were still fixing up their fish camps and getting ready for the salmon run to increase (Table 4). During this survey week, 59% of fishermen reported using driftnets with smaller reporting using setnets or both drift and setnets. For this survey period the 49% of fishermen were using only gill nets greater than 6 inch mesh, however, 44% indicated they were using both greater than 6 inch mesh and ≤6 inch mesh and 7% were using only the smaller mesh nets (Table 4).

For the survey week ending June 19, 57 families were interviewed, and 56 of them reported actively fishing. Salmon fishing was closed by emergency order within the survey area for Chinook conservation for 4 days during this survey week (Brazil et al. 2013). Surveys are reflective of the days that people were allowed to fish with 66% of families reported using drift nets; 29% reported using both drift and set net at the same time; and 5% indicated only using set net for salmon harvest. The majority of (43%) of fishermen reported using mesh greater than 6 inch and 34% reported using both mesh sizes with the remainder using only setnet (Table 4).

During the survey week ending June 26, salmon fishing was closed by emergency order within the survey area for 4 days of a 5 day closure for Chinook salmon conservation (Table 4; Brazil et al. 2013). This survey period reflects subsistence fishing effort for the time period of Monday June 20 through Wednesday June 22. During that time 49 families were surveyed and 90% reported actively fishing for salmon during the allowed time period. Seventy percent of families indicated they were using drift nets and 55% of those surveyed reported using mesh greater than 6 inches. The other half of the fishing respondents were split between either using both gear size classes in the same week or only using mesh 6 inches or less (Table 4).

During the week ending July 3, subsistence salmon fishing was closed on 3 days: the final day of the closure from the prior week and an additional 2 day closure initiated by federal special action (Brazil et al. 2013). When fishing was open, mesh size was restricted to 6 inches or less. For this week, the survey responses reflect the fishing activity that occurred in the subsistence fishing periods allowed between the above closures. Mesh size use was also affected by emergency closure requirements during part of the survey week. During this survey period 45 families were interviewed and 91% reported fishing during the open periods. Most families reported using drift nets with the 46% reporting use of mesh 6 inches or less (Table 4).

Mesh size restrictions remained in place through federal special action for 4 days of the final survey week, ending July 10 (Brazil et al. 2013). Of the 71 families interviewed this survey period only 15 reported fishing during this time. Approximately 23% of the families interviewed indicated they did not fish this week because of the disruption or difficulty fishing around the subsistence closures. Other respondents reported not fishing for unrelated reasons. Most fishermen reported using drift gill nets. The majority (40%) reported using nets with mesh 6 inches or less and similar numbers reported using larger gear or both gear size categories (33% and 20%). One

fishermen reported using rod and reel during this week to catch a few salmon for freezing (Table 4).

REPORTS TO THE KUSKOKWIM SALMON MANAGEMENT WORKING GROUP

ONC subsistence fisheries biologist and technicians composed and presented 6 summary reports of the survey results during the project operational period (Appendices B1 to B6). These reports were presented via email and orally over teleconference to state and federal fisheries managers and to all other Working Group participants, including both members and other interested parties. Oral reports were delivered during inseason meetings of the Working Group. Oral reports provided an opportunity to present the data publically, allow question and answer discussion, and encourage additional discussion and feedback from subsistence fishermen.

DISCUSSION

This project relies on voluntary participation by Bethel-area subsistence fishermen, and most respondents have participated since 2001. The majority of participants are lifelong residents of the Kuskokwim Area, representing some of the most experienced and knowledgeable fishermen. Most of these families are of Alaska Native descent, and harvest and process salmon at seasonal fish camps that have been maintained across generations. Interviewees typically have between 10 and 50 years of adult experience fishing in the region. Both ONC technicians who participated in this project have themselves many years of local subsistence fishing experience. Their family relations and community connections on the Kuskokwim River foster trust and familiarity that is essential to the success of the program. Information used to manage the Kuskokwim River fisheries early in the season consisted of Bethel test fishery indices of salmon abundance (e.g. Bue and Brazil 2012) and subsistence harvest reports like those provided through this project. Later in the season, data from fisheries monitoring projects augmented this information. The inseason catch monitoring interviews provided an early indication of salmon run timing, harvest effort and relative success of catch rates in the subsistence fishery and an indication of whether families' subsistence salmon harvest goals are being met for the season.

More families were interviewed this year than in previous years in part because people were encountered at their fish camps more frequently during the concentrated fishing periods that occurred around emergency closures. Some additional qualitative comments seemed to appear quite often during interviews, but seemed to shift as the season progressed and restrictions were implemented. For example, with mounting evidence that the Chinook salmon run was poor, many respondents indicated they would target fewer Chinook salmon and attempt to catch more sockeye salmon to meet their family's subsistence fish needs for the year (Appendices B2, B3, B4, and B5). Conversely, there was some agreement that there may have been some increased fishing activity very early in the Chinook salmon run, prior to emergency salmon fishing closures (Appendix C1). Some fishermen felt they could not accurately assess run timing or catch rates compared to normal patterns because they could not fish consistently according to their annual schedule, or they had to change location and fishing gear to accommodate the closures (Alissa Joseph, ONC Fisheries Technician, personal communication).

The majority felt the Chinook salmon run was early to normal in the first 2 survey weeks. Likewise early on in the first 2 survey weeks most respondents felt the sockeye and chum salmon run timing was early to normal. Overall for the survey season most respondents indicated they were getting good to normal catches of most salmon species when they were allowed to fish

(Appendix B4). While some families expressed some confusion and hardship around multiple emergency subsistence closures this year, the majority reported meeting their family's salmon fishing needs for the year. Those that indicated they had not yet met their family's harvest goals by the end of the survey season either planned to harvest more coho salmon in the fall or said they were satisfied with what they did have and would "make do" with less this year (Appendix B6).

Many fishermen and their families commented on the importance of putting up salmon to dry early in the season to avoid the flies and wet weather that typically arrive later in the summer. Some survey respondents shared strong feelings about the emergency conservation closures, stating that the closures had prevented them from fishing during periods of good weather, critical to drying and preserving fish properly (Appendices C5 and C6). These fishermen felt it was counterproductive to push subsistence fishing later into the summer because the conservation efforts might be lost to spoilage of fish from the effects of moisture from rain and fly maggots.

In the first couple weeks of surveys, the detailed feedback from the fishermen on the health, timing, and abundance of the Chinook salmon run were generally positive. Initial impressions from some respondents fishing early in the season indicated the run timing and size of the Chinook salmon run was either early, or had returned to the "Normal" that they recalled from several years past. Most who were catching fish felt that the run seemed to be healthy thus far, with much larger Chinook salmon being caught earlier than the prior year. However by mid-June many families reported that they had switched to smaller mesh gear to target the more abundant small sized Chinook salmon and that they were catching fewer females than usual. Although, some noted that in the final days of the survey period, they had begun to catch a few bigger Chinook salmon and that the percentage of females had increased. They referred to this as the "second pulse" of kings. Many families were switching back and forth between mesh sizes or had different sized set and drift nets in an effort to fish efficiently for all salmon species.

At the end of the inseason surveys in 2011 many families commented that they would also be attempting to harvest more coho to make up for their smaller Chinook salmon harvests in 2011. The *Kuskokwim Inseason Subsistence Catch Monitoring Program* currently does not extend through the August coho run. Subsistence coho harvest is an important part of meeting many families' subsistence salmon needs for the year. For long-term fisheries management purposes, it is important to consider that a reduced harvest of one species may result in a greater compensation harvest of another species in order to meet subsistence needs for the year.

CONCLUSIONS

The *Kuskokwim Inseason Subsistence Catch Monitoring* program has helped facilitate dialogue between subsistence fishermen and area fisheries managers. Not only did the ONC fisheries technicians gather the primary survey data, but they also gathered a full range of comments from subsistence fishermen on their experiences, observations, or concerns as they harvested salmon each week. Topics of these comments included the health of salmon, environmental conditions, fishing gear use, and socioeconomic factors that have bearing on fishing activities. The program has served as a regular point of contact for subsistence fishermen to ask questions about Kuskokwim fisheries research and management while residing at their fish camps. Many people do not have the opportunity to engage in the information sharing or discussions that take place in Working Group meetings in Bethel; these meetings usually occur during office work hours and during the most active subsistence fishing period of the year. ONC fisheries biologist and

technicians also conducted extensive outreach on the Chinook salmon conservation concerns and provided answers and feedback to questions and concerns expressed by area subsistence fishermen. Much outreach in 2011 was focused on relaying information on emergency Chinook salmon conservation closures to subsistence fishing, clarifying when and where the closures were occurring, and explaining what information was used in making the management decisions.

ONC fisheries technicians were trained and mentored throughout the project operational period in interviewing methods, data recording, and summary report writing. Technicians also gained knowledge and experience in the area subsistence fisheries management process through presenting reports, participating in ongoing discussion about management issues during the field season, and receiving mentorship from Working Group members on various aspects of engagement in subsistence fisheries research, monitoring, and management.

ACKNOWLEDGEMENTS

We wish to thank the many subsistence fishermen and families who generously volunteered time from their busy fishing schedule to provide the detailed local information that is critical to making inseason management decisions for the Kuskokwim River fisheries. We extend great appreciation and regard for the Working Group members, many of whom have volunteered years of dedicated service to facilitating this local cooperative management process.

We wish to thank ONC fishery technician, Alissa Joseph, for her enthusiastic second year on this project and role as the project crew leader. We also wish to thank ONC inseason fisheries technician Iyana Dull for his successful first year on the project and especially his contribution sharing his weir and Bethel test fish work experiences with subsistence fishermen interested in the management data. The ONC interns' knowledge of families and fish camps in the Bethel area and excellent interviewing skills have greatly facilitated the involvement of subsistence fishermen in the fisheries management process. Thanks to Jan M. Conitz (ADF&G); Greg Roczicka (ONC); and Pippa Kenner (Office of Subsistence Management) who reviewed this document. Special thanks to Greg Roczicka and Bev Hoffman for their valuable input of additional comments from local area subsistence fishermen throughout the project season and for facilitating the sharing of this information via their role as Co-Chairs of the Working Group.

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TABLES AND FIGURES

Table 1.–District W-1 Kuskokwim River, commercial fishing periods with related subsistence closures, 2011.

Period Number	Date	Subdistrict	Length of Commercial Opening (h)	Subsistence Closure total (h)
1	Jul 05	1-B	4	13
2	Jul 07	1-A	3	12
3	Jul 09	1-A	3	12
4	Jul 11	1-A	3	12
5	Jul 13	1-B	4	13
6	Jul 15	1-A	3	12
7	Jul 18	1-A	4	13
8	Jul 20	1-A	4	13

Note: The 2011 District W-1 commercial fishing season began on July 5 and ended on August 22.

Table 2.–Number of Lower Kuskokwim area subsistence fishermen characterizing their weekly salmon catch rates, as "Very Good", "Normal", or "Poor", 2011.

Week Ending	Number of Families			Number of Fishing Respondents								
				Chinook Catch Rates			Chum Catch Rates			Sockeye Catch Rates		
	Interviewed	Fishing	Not Fishing	Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
Jun 05	36	11	25	4	4	0	[a]	[a]	[a]	1	1	0
Jun 12	69	41	28	3	14	20	4	19	4	4	19	3
Jun 19	57	56	1	14	21	20	8	29	11	8	32	10
Jun 26	49	44	5	6	10	28	9	16	15	10	26	4
Jul 03	45	41	4	27	6	8	32	4	4	31	7	2
Jul 10	71	15	56	2	0	10	12	1	0	5	3	5
Total [b]	327	208	119									
Average	55	35	20									

Note: Represents responses to the question "Compared with this time in a 'Normal' year, how were catch rates for salmon this week?"

[a] Indicates interviewees declined to comment, often because it is too early in the run to assess.

[b] Represents the total number of interviews conducted during the survey year; most families were interviewed more than once.

Table 3.–Number of Lower Kuskokwim River area subsistence fishermen, by week, that characterized the salmon run timing (by species) as "Early", "Normal", or "Late", 2011.

Week Ending	Number of Families			Number of Fishing Respondents								
	Interviewed	Fishing	Not Fishing	Chinook Catch Rates			Chum Catch Rates			Sockeye Catch Rates		
				Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
Jun 05	36	11	25	4	4	0	[a]	[a]	[a]	2	0	0
Jun 12	69	41	28	11	18	8	16	10	3	14	12	2
Jun 19	57	56	1	10	27	16	10	30	7	7	35	6
Jun 26	49	44	5	3	23	9	1	29	6	2	32	1
Jul 03	45	41	4	3	29	6	4	32	3	7	27	5
Jul 10	71	15	56	0	6	5	1	10	0	0	8	4
Total [b]	327	208	119									
Average	55	35	20									

Note: Represents responses from the question "Compared with this time in a 'Normal' year, how were catch rates for salmon this week?"

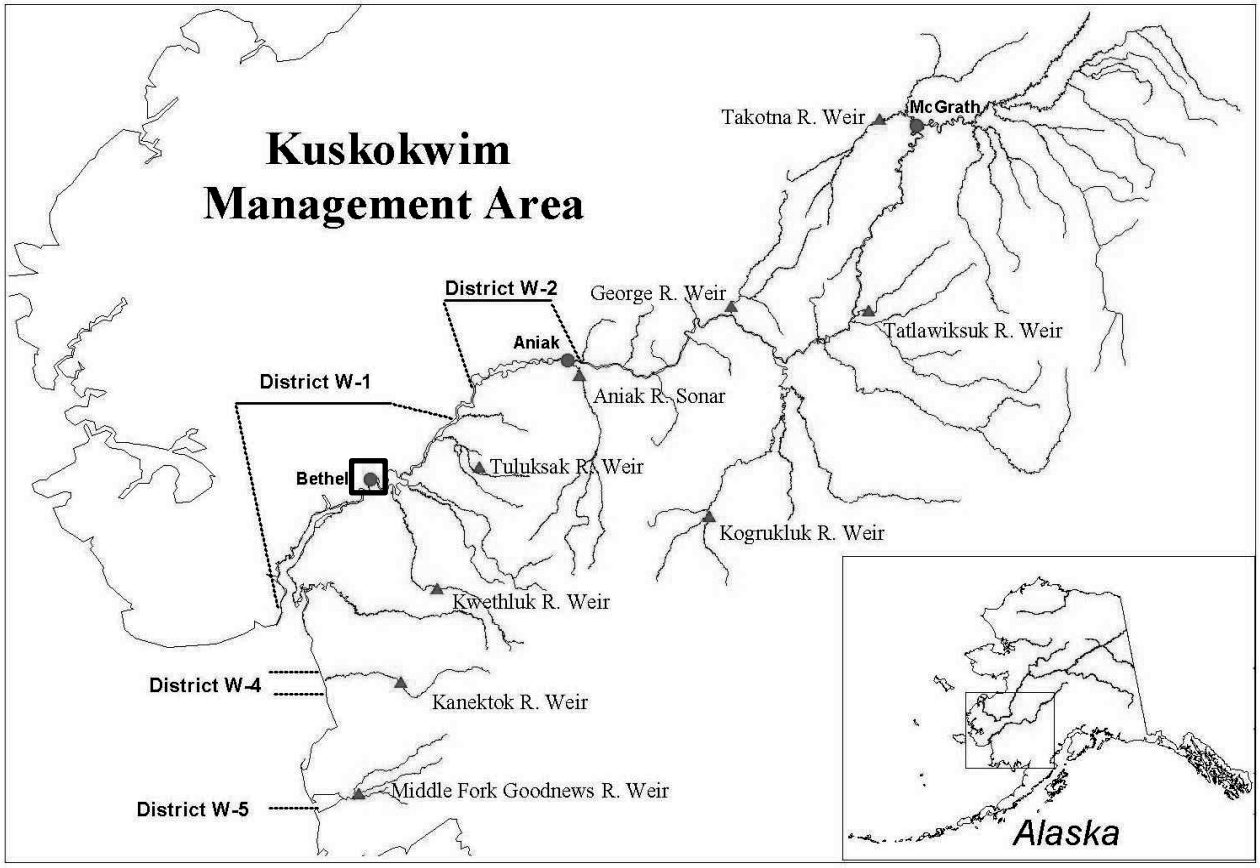
[a] Indicates interviewees declined to comment, often because it is too early in the run to assess.

[b] Represents the total number of interviews conducted during the survey year; most families were interviewed more than once.

Table 4.–Number of Lower Kuskokwim River area subsistence fishermen, by week, that indicated which type and size of salmon fishing gear they were using, 2011.

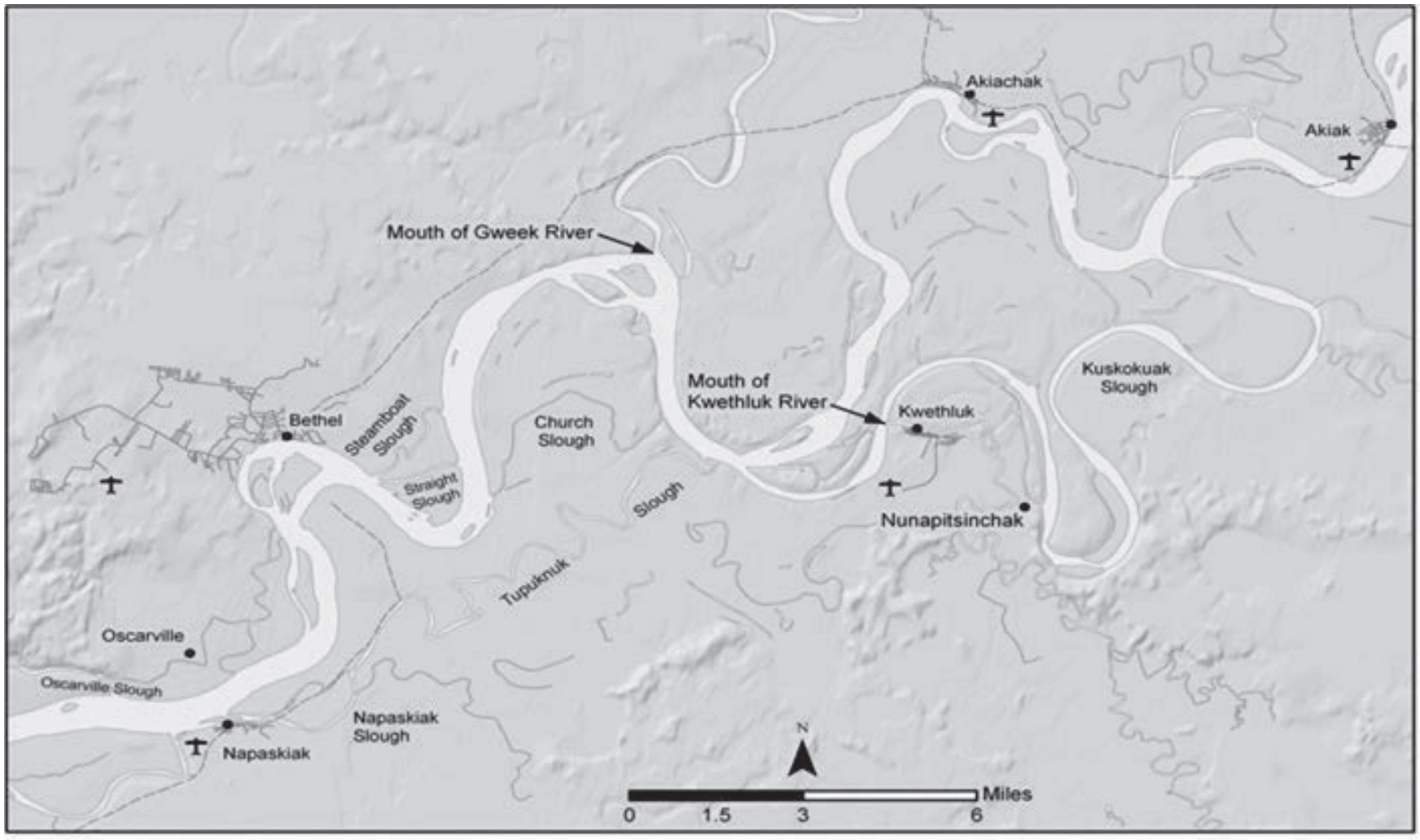
Week Ending	Number of Families		Gear Type				Mesh Size		
	Interviewed	Fishing	Only Drift net	Only Setnet	Both set and drift	Rod and Reel	Only > 6" mesh	Only ≤ 6" mesh	Both >6" and ≤6"
Jun 05	36	11	3	7	1	0	9	1	1
Jun 12	69	41	24	6	11	0	20	3	18
Jun 19	57	56	37	3	16	0	24	12	19
Jun 26	49	44	31	6	7	0	24	11	8
Jul 03	45	41	32	4	5	0	9	19	13
Jul 10	71	15	13	1	1	1	5	6	3
Total [a]	327	208							
Average	55	35							

[a] Represents the total number of interviews conducted during the survey year, most families were interviewed more than once.



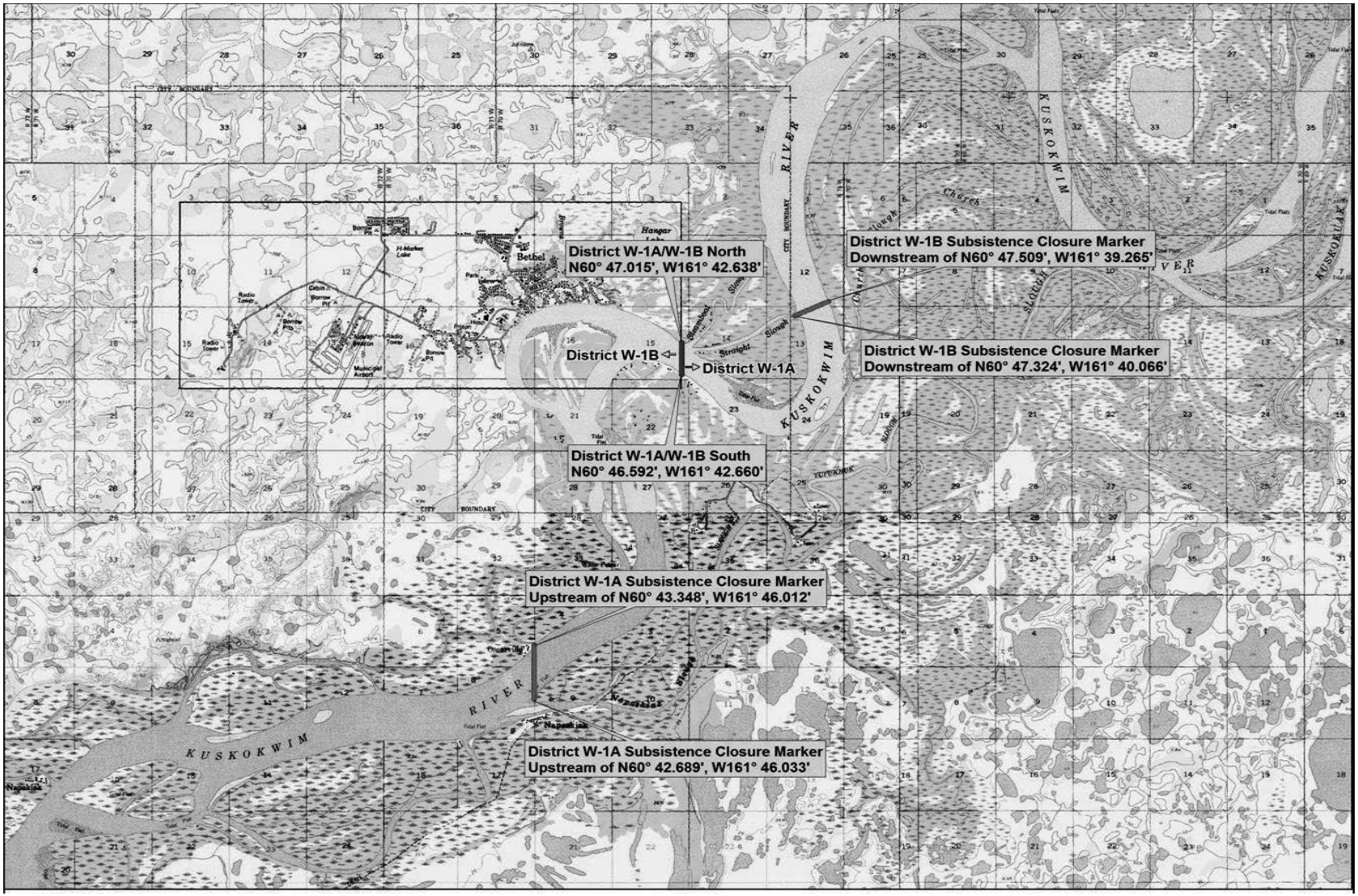
Note: Study area delineated by box around Bethel.

Figure 1.–Kuskokwim Management Area.



Note: Survey fish camps are located along the main channel of the Kuskokwim River and numerous sloughs located between the mouth of the Gweek River and the village of Napaskiak.

Figure 2.–Inseason subsistence harvest monitoring survey area, 2011.



Source: Map not to scale. © 2002 DeLorme (www.delorme.com) 3-D TopoQuads®

Figure 3.–District W1, Subdistricts W1-A and W1-B boundaries and subsistence salmon fishing closure boundaries of the Kuskokwim River.

APPENDIX A. EXAMPLE OF SURVEY INSTRUMENT

Appendix A1.–Example of Lower Kuskokwim River subsistence salmon fishing survey form.

Family Name: Lastname Firstname Community

Fishcamp Location

Date family started salmon fishing this year (month, day)

Primary Subsistence Salmon Fishing Areas

What are your family's salmon harvest goals this year ? (number of salmon) King _____, (Chinook) Chum _____, Sockeye _____, (" Red ")

		Salmon Fishing Gear Used This Week						Compared with this time in a "NORMAL" year, how were catch rates for salmon this week?									Does the salmon run appear to be running early, late, or normal?								
		Net Type		Mesh ?				King Salmon			Chum Salmon			Sockeye Salmon			King Salmon			Chum Salmon			Sockeye Salmon		
Staff initials	Week Ending	Drift Net	Set Net	6" or Less	More than 6"	Rod Reel	Fish Wheel	Very Good	OK Normal	Poor	Very Good	OK Normal	Poor	Very Good	OK Normal	Poor	Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
	28-May																								
	4-Jun																								
	11-Jun																								
	18-Jun																								
	25-Jun																								
	2-Jul																								
	9-Jul																								
	16-Jul																								
	31-Jul																								

Staff initials	Week Ending	Comments
		Few fish ? Lot of fish ? Weather affecting fishing? Water levels? Size of Fish ? Fish look healthy ? Fishing harder this year ? Drying condidtions? Fishing in more places/areas than usual
	28-May	
	4-Jun	
	11-Jun	
	18-Jun	
	25-Jun	
	2-Jul	
	9-Jul	
	16-Jul	
	31-Jul	

Were your family's salmon harvest goals achieved ? Kings _____, Chum _____, Sockeye_____.

When did your family stop subsistence fishing for: King Salmon_____, (month, day) Chum Salmon_____, (month, day) Sockeye Salmon_____, (month, day)

APPENDIX B. LOWER KUSKOKWIM RIVER INSEASON SUBSISTENCE SALMON CATCH MONITORING WEEKLY REPORTS, 2011

Appendix B1.–Lower Kuskokwim River inseason subsistence catch monitoring weekly report, Orutsararmiut Native Council, June 5, 2011.

Fishing ending the week of June 5, 2011.

Families Surveyed	Families Not Fishing	Using Driftnets	Using Setnets	Both	Gillnets More than 6" mesh	Gillnets 6" mesh or less	Both
36	25	3	7	1	9	1	1

Compared with this time in a normal year, how are catch rates for salmon this week?

Chinook			Chum			Sockeye		
Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
4	4	0	N/A	N/A	N/A	1	1	0

Does the salmon run appear to be running early, late, or normal?

Chinook			Chum			Sockeye		
Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
4	4	0	N/A	N/A	N/A	2	0	0

Comments: This week the ONC inseason subsistence fishery technicians distributed a total of 20 ASL sampling kits. Most kits were distributed to the people who had sampled for the subsistence Chinook ASL program in previous years and a few kits were provided to new families that expressed interest in sampling this year.

36 families were surveyed this week for the Inseason Subsistence Monitoring Program. 11 (31%) of the families interviewed were fishing this week. 25 (69%) of the families did not fish this week. 3 (27%) families reported using driftnets. 7 (63%) families reported using set nets. 1 (9%) families reported using both. 9 (82%) of the fishing families use gill net using 8 inch mesh, referred to as King gear. 1 (9%) of the families reported 6 inch mesh or less. 1 (9%) families reported using both.

Twenty-five (69%) of the families interviewed had not yet started fishing and said that they were just starting to get ready for the fishing season. Many families are just beginning fishing after fixing and cleaning their fish camps after the winter. Interviewees not fishing yet were getting their equipment ready and waiting for the fish run to increase. ONC technician's observations of fish activity on the river from the upper mouth of church slough down to Oscarville a total of 32 set nets, 31 drifters, and 6 whitefish nets.

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Chinook: Of the 11 families fishing this week. 4 (36%) families this week reported the Chinook catch is very good, 4 (36%) families reported the catch as normal, no families reported as poor. 25 (69%) families that have not started their Chinook harvest are just finishing up their repairs on camps. Many of the nets that used to catch king salmon this year are a lot larger mesh than previous years, due to the early run and high number of large kings that are coming into the river this year versus last year slow and small run.

Of the 11 (31%) families that reported fishing this week 4 (36%) families reported the run as early, 4 (36%) families reported the run timing as normal, no families reported the run to be late this year

Detailed feedback from the fishermen on the health, timing, and abundance of the Chinook run were generally positive. Most who were catching fish felt that the run seemed to be healthy thus far, with much larger Chinook being caught earlier than last year.

One fisher reported a catching a Chinook estimated to be over 45 lbs, and expressed surprise how large some of his first catches were this early in the run. . Another fisherman noted that the Chinook are coming in strong along with very large size sheefish.

Overall those catching fish felt the Chinook are coming in strong, healthy, and more abundant than the past few years. Some expressed that their catches seemed better catches than average overall and a few families even reported that they haven't seen a Chinook run this early since they were much younger. Other fishermen expressed that the catch rates for this time were normal when compared to their many years of fishing on the Kuskokwim but were better when compared to the last few years.

Chum: Still too early in the season to assess the run. N/A indicates the question was not asked specially at this time, as it is too early to be relevant.

Sockeye: Of the fishermen interviewed only 2 had caught sockeye. These two families (18%) reported the run timing as early, viewing it as unusual to catch sockeye in their first efforts of fishing for Chinook. No families report the sockeye run timing as normal. No families reported the sockeye run to be late compared to previous years.

It is still too early for most fishermen to comment on catch rates for the sockeye run, although one fisher (9%) interviewed felt his catch for this time-period was very good and 1 family (9%) reported their catches as normal. No families reported their sockeye catches as poor.

Appendix B2.–Lower Kuskokwim River inseason subsistence catch monitoring weekly report, Orutsararmiut Native Council, June 12, 2011.

Fishing ending the week of June 12, 2011.

Families Surveyed	Families Not Fishing	Using Driftnets	Using Setnets	Both	Gillnets More than 6" mesh	Gillnets 6" mesh or less	Both
69	28	24	6	11	20	3	18

Compared with this time in a normal year, how are catch rates for salmon this week?

Chinook			Chum			Sockeye		
Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
3	14	20	4	19	4	4	19	3

Does the salmon run appear to be running early, late, or normal?

Chinook			Chum			Sockeye		
Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
11	18	8	16	10	3	14	12	2

Comments: 69 families were surveyed this week for the in-season subsistence monitoring program. 41 (59%) of the families were fishing this week. 28 (41%) of the families did not fish this week. 24 (59%) families reported using driftnets. 6 (15%) families reported using set nets. 11 (27%) families reported using both. 20 (49%) of the families fishing used gill nets greater than 6 inch mesh. Many referred to using specifically 8 inch mesh called "king gear." 3 (7%) of the families reported 6 inch mesh or less. 18 (44%) families reported using both. 28 (41%) families had not yet started fishing and said that they were just starting to get ready for the fishing season. Many families are still fixing and cleaning fish camps after the winter season and have not yet started fishing. Some families are waiting for the Chinook run to increase or middle of the run when they can catch all 3 species for efficiency. Many families reported that they are switching to smaller mesh gear to target the more abundant small sized Chinook. A few families specifically stated they saw the Chinook conservation posters initiated by the Kuskokwim Salmon Management Working Group and they would make an effort to target more abundant sockeye using smaller mesh size throughout the entire season.

Some families that started early are well under way to getting their subsistence fish for the year and some have reported that they have met their harvest goals for king salmon. ONC received numerous reports of concern about a person in uniform contacting people at their fish camps to inform them there would be a subsistence closure this past weekend.

No fishing closure was yet discussed or planned by the Kuskokwim Salmon Management Working Group but many people expressed they responded to this rumor by rushing to get their Chinook salmon needs met before any closures were enacted. Many fishermen also commented that the river was heavily congested with setnets unlike they had ever seen before in their lifetime of fishing.

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Chinook:

Catch rate: Of the 41 families fishing this week. 3 (7%) families this week reported the Chinook catch is very good, 14 (34%) families reported the catch as normal, 20 (49%) families reported as poor. 4 (10%) families that have not started their Chinook harvest are just finishing up their repairs on camps. Many fishermen noted using 8 inch King gear but others noted they switched to smaller mesh gear in the form of 6-inch range or their 5.5 inch nets to get better catch rates of smaller kings as they felt fish were hitting the net and getting through. Others switched nets because they caught big snags on log debris and had to repair their 8 inch mesh.

Run timing: Of the 41 families that reported fishing this week 11 (27%) families reported the run as early 18 (44%) families reported the run timing as normal, 8 (19%) families reported the run to be late this year. 4 (10%) families were unable to comment on run timing as they had just set their net for the first time this year.

Many families noted that they were catching fewer kings after Wednesday, getting just a few fish per drift of in their set nets or none at all. Many fishermen noted that they were catching more small kings this week with fewer large size kings than last week or normal years. A couple fishermen noted they felt the smaller catch rates this week after good catch rates last week reflected the lull between two pulses of kings they often observe each year. Other fishermen noted they are still setting up camp would just begin fishing this week and mid-June was the normal time they start fishing each year.

Chum:

Catch Rate: 4 (10%) families reported their catch rates as good. 19 (46%) families reported their catches as normal. 4 (10%) families reported their chum catches as poor. 14 (34%) families didn't report due to no chum catches yet.

Run timing: 16 (39%) families reported the run return as early. 10 (25%) families report the salmon run timing as normal. 3 (7%) families reported the run to be late compared to previous years. 12 (29%) families were unable to report due to no chum catches yet.

Many people felt it was too early to comment on the timing or catch rate for chum as they were not targeting them specifically or catching any yet.

Sockeye:

Catch Rate: 4 (10%) families reported their catch rates as good. 19 (46%) families reported their catches as normal. 3(7%) families reported their sockeye catches as poor. 15 (37%) families didn't report due to no sockeye catches yet. Many people were catching sockeye as by-catch in their king gear.

Run timing: 14 (34%) families reported the run return as early. 12 (29%) families report the salmon run timing as normal. 2(5%) families reported the run to be late compared to previous years. 13 (32%) families were unable to report due to no sockeye catches yet.

Appendix B3.–Lower Kuskokwim River inseason subsistence catch monitoring weekly report, Orutsararmiut Native Council, June 19, 2011.

Fishing reports from June 15 –June 18, 2011.

Families Surveyed	Families Fishing	Using Driftnets	Using Setnets	Both	Gillnets More than 6" mesh	Gillnets 6" mesh or less	Both
57	56	37	3	16	24	12	19

Compared with this time in a normal year, how are catch rates for salmon this week?

Chinook			Chum			Sockeye		
Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
14	21	20	8	29	11	8	32	10

Does the salmon run appear to be running early, late, or normal?

Chinook			Chum			Sockeye		
Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
10	27	16	10	30	7	7	35	6

Comments: Salmon Fishing was closed in the survey area for a Chinook conservation closure beginning Thursday June 16 through Sunday June 19. Thus this survey report reflects subsistence fishing effort for the time-period of Monday June 13 through Wednesday June 15. 57 families were surveyed this week for the in-season subsistence monitoring program. 56 (98%) of the families were fishing this week. 1 (2%) of the families did not fish this week. 37 (66%) families reported using driftnets. 3 (5%) families reported using set nets. 16 (29%) families reported using both. 24 (43%) of the families fishing used gill nets greater than 6-inch mesh. Most using the greater than 6 inch category referred to using specifically 8 inch mesh called "king gear" but some indicated they were using 7-inch range gear. 12 (21%) of the families reported 6-inch mesh or less. 19 (34%) families reported using both.

The families interviewed this week were at varying stages of fishing with responses ranging from just beginning fishing to having completed king catches for the year. The families that had just begun fishing a day or two before the closure indicated mid-June is when they normally start fishing. Some families indicated they had started early or put in extra effort before the closure and had met their subsistence king harvest goals for the year or were satisfied with what they had. The majority of families interviewed were mid-way through their salmon harvest goals for the season and planned to resume fishing after the closure to meet their families' salmon needs for the year. All families indicated the weather had been good for drying fish this week and the flies had not yet come out. Several families who had just started fishing were concerned that the weather typically becomes more rainy later in June and worried that the timing of fish caught after this week's closure may not dry properly if it rained and may spoil if the flies

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arrived that lay eggs on the drying fish. The primary concern these families expressed was the flexibility to harvest fish when the weather was best for preserving them well because it was distressing to lose any fish to spoilage.

Many families reported that they had switched to smaller mesh gear to target the more abundant small sized Chinook and that they were catching fewer females than usual. Some noted that they were just beginning to catch a few bigger kings in the last couple days with a greater percentage of females and indicated this may be the arrival of what they referred to as the "second pulse" of kings. Many families were switching back and forth between mesh sizes or had different sized set and drift nets.

A few families specifically stated they saw the Chinook conservation posters initiated by the Kuskokwim Salmon Management Working Group and they would make an effort to target more abundant sockeye using smaller mesh size throughout the entire season. Many families commented they understood the Chinook conservation measures being sought by the closure. Some interviewees commented that the population of Bethel was growing and they had not seen such a high level of congested drift and set net fishing activity on the river in their lifetime as they experienced last week.

Chinook:

Catch rate: Of the 56families fishing this week. 14 (25%) families this week reported the Chinook catch is very good, 21 (38%) families reported the catch as normal, 20 (37%) families reported as poor. Many fishermen noted using 8 inch King gear but others noted they switched to smaller mesh gear in the form of 6-inch range or their 5.5 inch nets to get better catch rates of smaller kings as they felt fish were hitting the net and getting through. Many reported using both king gear and 6-inch or less to increase their catch rate as they felt there was a greater percentage of small kings. Most noted they had better catch rates of Chinook with the smaller size mesh this week with a few fishermen reporting some larger Chinook showing up a day or two before the closure. Many noted they had fewer females in their catch than they normally would at this point in the run but some felt more females usually show up later in the "second pulse".

Run timing: Of the 56 families that reported fishing this week 10 (18%) families reported the run as early 27 (48%) families reported the run timing as normal, 16 (29%) families reported the run to be late this year. 3 (5%) families did not comment on run timing as they had just begun fishing and could not yet assess the flow of fish for this time period.

Chum:

Catch Rate: 8 (14%) families reported their catch rates as good. 29 (52%) families reported their catches as normal. 11 (20%) families reported their chum catches as poor. 8 (14%) families didn't report due to no chum catches yet or felt that catches were only a reflection of by-catch in 8-inch mesh.

Run timing: 10 (18%) families reported the run return as early. 30 (54%) families report the salmon run timing as normal. 7 (13%) families reported the run to be late compared to previous years. 9 (16%) families were unable to report due to no chum catches yet. Some people felt it was too early to comment on the timing or catch rate for chum, as they were not targeting them specifically.

Sockeye:

Catch Rate: 8 (14%) families reported their catch rates as good. 32 (57%) families reported their catches as normal. 10 (18%) families reported their sockeye catches as poor. 6 (11%) families didn't report due to not targeting sockeye yet. Some people reported sockeye catch rates as the normal rate of by-catch in their king gear.

Run timing: 7 (12%) families reported the run return as early. 35 (63%) families report the salmon run timing as normal. 6 (11%) families reported the run to be late compared to previous years. 8 (14%) families were unable to report on run timing due to not specifically targeting sockeye yet.

Appendix B4.–Lower Kuskokwim River inseason subsistence catch monitoring weekly report, Orutsararmiut Native Council, June 26, 2011.

Fishing ending the week of June 26, 2011.

Fishing reports from June 20 –June 24, 2011.

Families Surveyed	Families Fishing	Using Driftnets	Using Setnets	Both	Gillnets More than 6" mesh	Gillnets 6" mesh or less	Both
49	44	31	6	7	24	11	8

Compared with this time in a normal year, how are catch rates for salmon this week?

Chinook			Chum			Sockeye		
Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
6	10	28	9	16	15	10	26	4

Does the salmon run appear to be running early, late, or normal?

Chinook			Chum			Sockeye		
Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
3	23	9	1	29	6	2	32	1

Comments: Salmon Fishing was closed in the survey area for a 5-day Chinook conservation closure beginning 12:01 am Thursday, June 23, through 12:01 Tuesday, June 28. Thus, this survey report reflects subsistence fishing effort for the time-period of Monday, June 20, through Wednesday, June 22. 49 families were surveyed this week for the in-season subsistence monitoring program. 44 (90%) of the families were fishing this week. 5 (10%) of the families did not fish this week. 31 (70%) families reported using drift nets. 6 (14%) families reported using set nets. 7 (16%) families reported using both. 24 (55%) of the families fishing used gill nets greater than 6-inch mesh. Most using the greater than 6-inch category referred to using specifically 8-inch mesh called "king gear," but some indicated they were using 7-inch gear. 11 (25%) of the families reported 6-inch mesh or less. 8 (18%) families reported using both.

1 family interviewed the fisher was not present and they were not sure what size mesh was used that week.

Some interviewed this week had just completed their harvest goals for Chinook. Others had some Chinook drying on the rack but planned to fish more to meet their harvest goals for the year if there was an opportunity. Some indicated they did not have as much Chinook as they normally put up for their families for the year but planned to target more Sockeye to make up for the difference. A couple of elders that indicated they had started fishing at their normal time in mid-June had net or boat repairs that kept them from fishing during this 3-day subsistence opening. They were concerned about being able to catch enough kings for their extended family after the 5-day closure, since they only had a handful of Chinook so far. A few elders also expressed they were concerned about the rush to fish that occurred before the closure, both out of concern that few fish would pass through to spawning grounds and the difficulty to fish in usual places because the river was so congested with boats.

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The majority of families interviewed were satisfied with caches so far and were well underway to meeting their salmon harvest goals for the season. Some families indicated that they were fishing a little less in order to conserve Chinook. Many planned to resume fishing for a few more kings and to target sockeye specifically after the closure to meet their family's salmon needs for the year. All families indicated the weather had still been decent for drying fish this week. Some families expressed concern that the weather would be rainy after the fishing closure which would make drying fish more prone to spoiling.

Some families were still reporting that they had switched to smaller mesh gear to target more abundant smaller Chinook and that they were catching fewer females than usual. A few fishermen indicated that Chinook were getting smaller each year, even though many fishermen caught larger and more female kings in the last day or two of the subsistence opening. A few families were already catching Chinook slightly blush with spawning colors.

Chinook:

Catch rate: Of the 44 families fishing this week, 6 (14%) families reported the Chinook catch as very good, 10 (22%) families reported the catch as normal, 28 (64%) families reported it as poor. Many fishermen noted using 8-inch "king gear" but others noted they switched to smaller mesh gear (6-inch or 5.5-inch) to catch smaller kings and to prevent fish from hitting the net and getting through it. Some reported using both "king gear" and 6-inch or less to increase their catch rate because of the greater percentage of small kings. Most noted they had better catch rates of Chinook with the smaller size mesh this week but more fishermen reported some larger Chinook showing up a day or two before the closure. Several fishermen commented that the water levels were low and clear which may allow fish to see the nets or swim deeper. These fishermen noted better catches at night with less visibility and an overall majority of catches near the bottom of the net just above the lead line.

Run timing: Of the 44 families that reported fishing this week, 3 (7%) families reported the run as early, 23 (52%) families reported the run timing as normal, and 9 (20%) families reported the run to be late this year. 9 (20%) families did not comment on run timing. Many noted their own fishing pattern was different this year due to the closures and so they felt they didn't have a good sense of what stage the run was at.

Chum:

Catch Rate: 9 (21%) families reported their catch rates as good. 16 (36%) families reported their catches as normal. 15 (35%) families reported their chum catches as poor. 4 (9%) families didn't report due to no chum catches yet or felt that catches were only a reflection of by-catch in 8-inch mesh.

Run timing: 1 (2%) family reported the run return as early. 29 (66%) families reported the salmon run timing as normal. 6 (14%) families reported the run to be late compared to previous years. 8 (18%) families were unable to report due to few chum catches yet.

Sockeye:

Catch Rate: 10 (23%) families reported their catch rates as good. 26 (59%) families reported their catches as normal. 4 (9%) families reported their sockeye catches as poor. 4 (9%) families didn't report due to not targeting sockeye yet. Some fishermen indicated getting good catches of large robust sockeye this year and hoped to dry more sockeye to make up for smaller Chinook harvests.

Run timing: 2 (5%) families reported the run return as early. 32 (73%) families reported the salmon run timing as normal. 1 (2%) family reported the run to be late compared to previous years. 9 (20%) families were unable to report on run timing due to not specifically targeting sockeye yet.

Appendix B5.–Lower Kuskokwim River inseason subsistence catch monitoring weekly report, Orutsararmiut Native Council, July 3, 2011.

Fishing ending the week of July 3, 2011.

Fishing reports from June 28 –June 30, 2011.

Families Surveyed	Families Fishing	Using Driftnets	Using Setnets	Both	Gillnets More than 6" mesh	Gillnets 6" mesh or less	Both
45	41	32	4	5	9	19	13

Compared with this time in a normal year, how are catch rates for salmon this week?

Chinook			Chum			Sockeye		
Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
27	6	8	32	4	4	31	7	2

Does the salmon run appear to be running early, late, or normal?

Chinook			Chum			Sockeye		
Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
3	29	6	4	32	3	7	27	5

Comments: Salmon Fishing was closed in the survey area for a 5-day Chinook conservation closure beginning 12:01 am Thursday, June 23, through 12:01 Tuesday, June 28. Thus, this survey report reflects subsistence fishing effort for the time-period of Tuesday, June 28, through Wednesday, June 29th. Subsistence fishing was allowed with up to greater than 6-inch mesh on Tuesday June 28th after an ADF&G and joint Kuskokwim Salmon Management Working Group closure from 12:01 a.m. Thursday June 23 through 11:59 p.m. Monday June 27th. Fishing was allowed on Wednesday June 29 with 6-inch mesh and less after an ADF&G and joint Working Group decision to limit subsistence fisheries to 6-inch mesh and less until July 7th. Subsequently the USFWS Yukon Delta National Wildlife Refuge announced an emergency closure to all salmon fishing and restricted the use of nets to only 4-inch mesh or less from 12:01 am Thursday June 30 through 12:59 pm Saturday July 2nd.

45 families were surveyed this week for the in-season subsistence monitoring program. 41 (91%) of the families were fishing this week. 4 (09%) of the families did not fish this week. 32 (78%) families reported using drift nets. 4 (10%) families reported using set nets. 5 (12%) families reported using both. 9 (22%) of the families fishing used gill nets greater than 6-inch mesh. 19 (46%) of the families reported 6-inch mesh or less. 13 (32%) families reported using both.

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Most fishermen interviewed this week had just reached their harvest goals for Chinook after the two day opening. Many indicated they did not have as many Kings as they normally would but were satisfied with what they had for the year. Some families indicated that they were fishing a little less this year in order to conserve Chinook. Some still planned to resume fishing to target sockeye and chum salmon specifically after the closure to meet their family's salmon needs for the year. All families indicated the weather had been dry enough with moderate temperatures for drying fish this week with hardly any flies that spoil fish.

Some elders interviewed at fish camp were concerned about meeting their salmon needs this year as they had just begun fishing at their usual time in mid-June and then had difficulties with getting out to drift fish between subsequent scheduled subsistence closures due to torn nets, boat problems, or other reasons. Other elders indicated they only used a set net for salmon and could not catch enough fish in the set net with the short openings between subsistence closures.

Chinook:

Catch rate: Of the 41 families fishing this week, 27 (66%) families reported the Chinook catch as very good, 6 (15%) families reported the catch as normal, 8 (19%) families reported it as poor. Greater than 6-inch mesh was only allowed on one day this survey period but many fishermen reported getting good catches of larger and more female kings on Tuesday when larger mesh gear was allowed. Many fishermen expressed that earlier their catches consisted of predominantly unusually small, male kings but they caught their biggest kings this year on this recent subsistence opening. Many expressed they felt this was the strongest part of the Chinook run they experienced yet this summer.

Run timing: Of the 41 families that reported fishing this week, 3 (7%) families reported the run as early, 29 (71%) families reported the run timing as normal for this time, and 6 (15%) families reported the run to be late this year overall. 3 (7%) families did not comment on run timing for this week. Many fishermen noted that a large number of the kings they caught were quite red and appeared nearing spawning condition. Some fishermen expressed that when the salmon are blush with spawning colors indicated the Chinook were nearing the tail end of the run.

Chum:

Catch Rate: 32 (78%) families reported their catch rates as good. 4 (10%) families reported their catches as normal. 4 (10%) families reported their chum catches as poor. 1 (2%) families didn't report due to no chum catches yet or felt that catches were only a reflection of by-catch in 8-inch mesh.

Many fishermen reported getting their nets full of chum after only setting the net out and that they finished fishing on Wednesday after a big catch of bright, robust chum.

Run timing: 4 (10%) family reported the run return as early. 32 (78%) families reported the salmon run timing as normal. 3 (7%) families reported the run to be late compared to previous years. 1 (2%) families were unable to report due to few chum catches yet.

Sockeye:

Catch Rate: 31 (76%) families reported their catch rates as good. 7 (17%) families reported their catches as normal. 2 (5%) families reported their sockeye catches as poor. 1 (2%) families didn't report due to not targeting sockeye yet. Many fishermen reported very good catches of sockeye and were happy the run was strong to put up more sockeye this year to augment their smaller than usual king catches.

Run timing: 7 (17%) families reported the run return as early. 27 (66%) families reported the salmon run timing as normal. 5 (12%) families reported the run to be late compared to previous years. 2 (5%) families did not report on run timing.

Appendix B6.–Lower Kuskokwim River inseason subsistence catch monitoring weekly report, Orutsararmiut Native Council, July 10, 2011.

Fishing ending the week of July 10, 2011.

Fishing reports from July 4 – July 10, 2011.

Families Surveyed	Families Fishing	Using Driftnets	Using Setnets	Both	Gillnets More than 6" mesh	Gillnets 6" mesh or less	Both	Rod & Reel
71	15	13	1	1	5	6	3	1

Compared with this time in a normal year, how are catch rates for salmon this week?

Chinook			Chum			Sockeye		
Very Good	Normal	Poor	Very Good	Normal	Poor	Very Good	Normal	Poor
2	0	10	12	1	0	5	3	5

Does the salmon run appear to be running early, late, or normal?

Chinook			Chum			Sockeye		
Early	Normal	Late	Early	Normal	Late	Early	Normal	Late
0	6	5	1	10	0	0	8	4

Comments: Prior to this survey week Federal waters of the Kuskokwim River were closed to subsistence fishing for salmon with mesh greater than 4 inches from June 30 through July 2. Salmon fishing was restricted to 6-inch mesh and less until July 7th this week after which all mesh sizes were allowed again in the survey area based on the last ADF&G joint Salmon Management Working Group decision. There was a commercial fishery opening in W1 sub-district 1-B (below Bethel) on July 5 and was closed to subsistence salmon fishing 6 hours before, during, and 3 hours after below Straight Slough. There were 2 subsequent commercial openings this week on July 7, and 9 in sub-district 1A (above Bethel) and the Kuskokwim River was closed to subsistence salmon fishing 6 hours before, during, and 3 hours after on the river above the village of Oscarville.

71 families were surveyed this week for the in-season subsistence monitoring program. 15 (21%) of the families were fishing this week. 16 (23%) of the families said they did not fish this week because of the disruption of the closures. 14 (20%) of the families that didn't fish are waiting for Coho to finish harvest goals. 3 (20%) of the families that didn't fish this week for salmon are going to start harvesting Cisco. 40 (56%) of the families reported to be done fishing.

13 (87%) families reported using drift nets. 1 (7%) family reported using set net. 1 (7%) family reported using both. 1 (7%) family reported starting to go Rod and Reel for freezer fish. 6 (40%) of the families fishing used gill nets greater than 6-inch mesh. 5 (33%) of the families reported using 6-inch mesh or less. 3 (20%) families reported using both.

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The majority of families that were surveyed this week indicated they had finished their salmon fishing for the year. Most had previously indicated they had met their subsistence salmon needs for the year or were satisfied with what they had. Many of these families indicated they had harvested less Chinook than in normal years but made up for some of their total harvest goals by harvesting more sockeye and chum. Families who had started fishing later in the season expressed frustration and discouragement at the overlapping Federal and State subsistence closures. These families felt the short notice information was confusing and they hadn't had a chance to put up enough fish to dry until after the closures and then it was too rainy to dry fish properly. Some of these families that indicated they didn't yet have enough dry fish for the year said they did not plan to fish again unless the weather improved enough to safely dry the salmon and keep it from spoiling.

Many families interviewed this week indicated that they planned to fish for coho. Some of these families expressed they usually fish for some coho and preserve it as frozen fish but others expressed that they don't normally fish for coho but would this year to try and augment their lower Chinook catches. Some families said they would target more whitefish to meet their total subsistence needs this year because 4-inch mesh was still allowed during the subsistence closures for salmon conservation measures and during the closures around commercial salmon fishing periods.

Chinook:

Catch rate: Of the 15 families fishing this week, 2 (13%) families reported the Chinook catch as very good, 0 families reported the catch as normal, 10 (67%) families reported it as poor. 3 (20%) families were not able to comment. Mesh restrictions allowing only 6-inch and less fish nets were lifted as of Thursday July 7th. Many families still made observations that the Chinook seemed to be smaller in size and less abundant overall than last year's run. A few fishermen were concerned that low catch rates in their set nets was due to people stealing fish and they felt this was more of a problem this year than before.

Run timing: 0 families reported the run as early, 6 (40%) families reported the run timing as normal for this time, and 5 (33%) families reported the run to be late this year overall. 4 (27%) families did not comment on run timing for this week. People who are still fishing or retained their commercial catch of Chinook for subsistence as required noted that they were still catching of a few kings that were still silver with no spawning color. Some fishermen indicated that normally around June 20th of every year through the first week of July is when they start to catch bigger and more female kings but that this year they were unsure of the overall run timing due to not fishing around the subsistence closures.

Harvest Goals: 14 of the families interviewed this week reported to meet harvest goals. Many families that reported being done fishing in previous weeks had already met their Chinook harvest goals for the year or harvested less for conservation reasons. 5 families interviewed this week reported not meeting their harvest goals for Chinook.

Chum:

Catch Rate: Of the 15 families fishing this week, 12 (80%) families reported their catch rates as good. 1 (7%) family reported their catches as normal. 0 families reported their chum catches as poor. 2 (13%) families were not able to comment. Many fishermen reported fishing one minute drifts and pulling in their nets as fast as they can, due to the abundance of chum sinking their nets.

Run timing: 2 (13%) families reported the run return as early. 10 (67%) families reported the salmon run timing as normal. 0 families reported the run to be late. 3 (20%) families were not able to comment.

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Harvest Goals: 15 of the families reported meeting their harvest goals for chum this year. 1 family reported not meeting their chum harvest goals yet.

Sockeye:

Catch Rate: Of the 15 families fishing this week, 5 (33%) families reported their catch rates as good. 3 (20%) families reported their catches as normal. 5 (33%) families reported their sockeye catches as poor. 2 (13%) families were not able to comment. Many fishermen reported very good catches of sockeye and were happy the run was strong to put up more sockeye this year to augment their smaller than usual king catches.

Run timing: 0 families reported the run return as early. 8 (53%) families reported the salmon run timing as normal. 4 (27%) families reported the run to be late compared to previous years. 3 (20%) families were not able to comment.

Harvest Goals: 15 of the families reported to meet harvest their harvest goals for sockeye this year. 1 family reported not meeting their sockeye goals yet.

APPENDIX C. HISTORICAL CAMPARISONS OF SURVEY SUCCESS 2003–2011

Appendix C1.–Historical comparison of survey success, Orutsararmiut Native Council.

Year	Week Ending	Interviewed	Fishing	Not Fishing
2011	Jun 05	36	11	25
	Jun 12	69	41	28
	Jun 19	57	56	1
	Jun 26	49	44	5
	Jul 03	45	41	4
	Jul 10	71	15	56
2010	Jun 06	19	6	13
	Jun 13	39	28	11
	Jun 20	26	23	3
	Jun 27	37	37	0
	Jul 04	38	36	2
	Jul 11	20	11	9
2009	Jun 07	20	6	14
	Jun 14	43	38	5
	Jun 21	44	44	0
	Jun 28	36	31	5
	Jul 05	36	5	31
	Jul 12	36	2	34
2008	Jun 08	27	5	22
	Jun 16	34	17	17
	Jun 22	32	27	5
	Jun 29	33	27	6
	Jul 08	35	15	20
	Jul 13	32	3	29
2007	Jun 03	ND	ND	ND
	Jun 12	39	28	11
	Jun 17	40	33	7
	Jun 24	44	40	4
	Jul 02	36	20	12
	Jul 08	33	10	23
	Jul 14	33	6	27

Year	Week Ending	Interviewed	Fishing	Not Fishing
2006	Jun 03	22	0	22
	Jun 10	32	19	13
	Jun 17	36	30	6
	Jun 25	48	43	5
	Jul 02	46	14	32
	Jul 09	38	8	30
	Jul 17	26	5	21
2005	Jun 06	34	12	22
	Jun 11	39	26	13
	Jun 18	48	42	6
	Jun 25	48	34	14
	Jul 02	32	2	30
	Jul 09	22	2	20
2004	Jun 05	31	10	21
	Jun 12	41	37	4
	Jun 19	35	31	4
	Jun 26	43	31	12
	Jul 03	44	22	22
	Jul 10	44	13	31
2003	Jun 07	18	9	9
	Jun 14	33	24	9
	Jun 21	48	32	14
	Jun 28	50	34	16
	Jul 05	45	21	24
	Jul 12	46	14	32